MARINE REVIEW.

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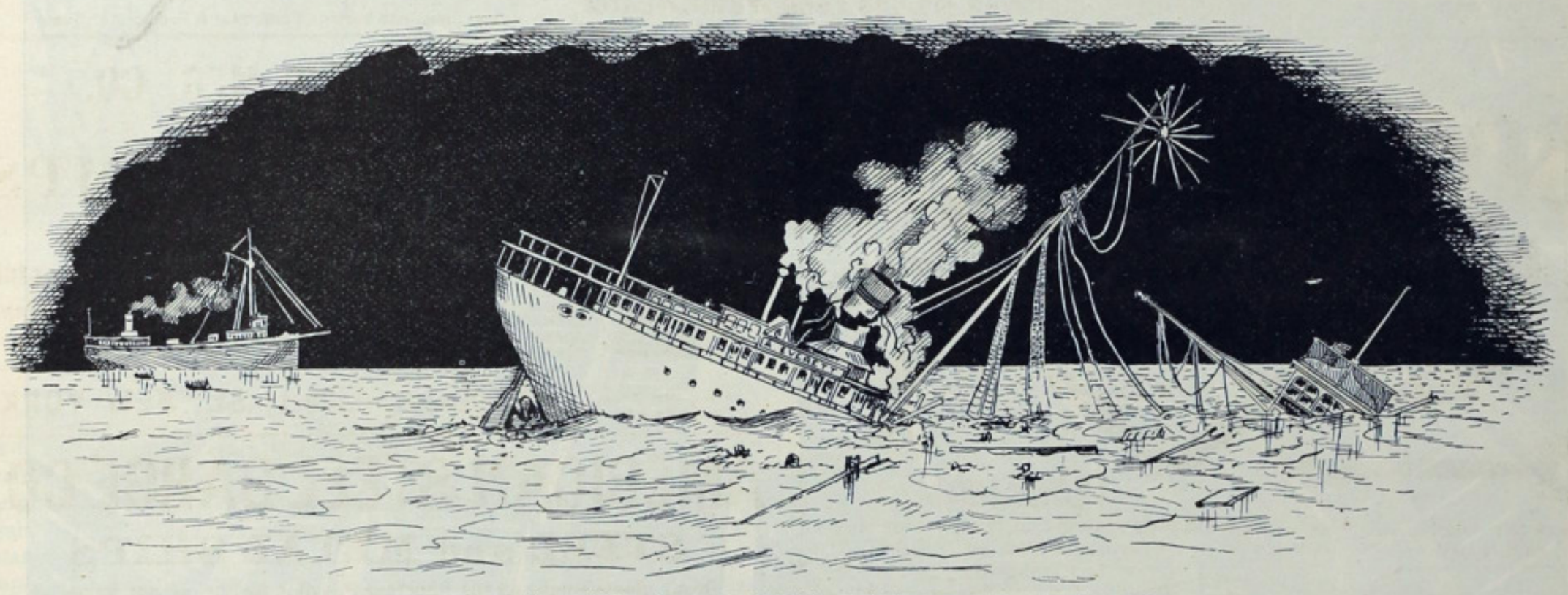
Sinking of the Everett.

The engraving on this page is a reproduction of a rough sketch made by one of the crew of the wooden steamer A. Everrett, after that boat had gone down in Saginaw bay, Lake Huron, at 8 o'clock on Tuesday evening last, upon coming in contact with heavy sunken ice. The sinking of the Everett is described by members of the crew, who witnessed it from the deck of the steamer Eber Ward, which had come to their assistance, as a most interesting sight, but not by any means a welcome one, as several of the men had been in her during two or three seasons. The Everett was one of the older class of wooden steamers, but she was valued for insurance purposes at $50,000, and was capable of carrying 48,000 bushels of corn, which was the amount of cargo sunk with her. She encountered ice floes about 20 miles above Point au Barques, and on coming in contact with one of them, unusually heavy, a hole was made in her forward, so large that pumps were inadequate to cope with it, and the boat had to be abandoned in ten minutes after she began leaking. Luckily, the steamer Eber Ward, which was only a few miles distant, but farther into the lake, so that she escaped the heaviest ice, answered distress signals and picked up the crew of the Everett from small boats. The Ward stood by and everybody aboard her witnessed the sinking of the Everett. The night was clear and the lake calm. The Everett went down bow first, and in doing so threw out her pilot house and forward mast. The strain on the whistle rope caused the whistle to blow fiercly while the boat was going down, and with the crash of breaking timbers and breaking smokestack, and the usual heavy sound attending the sinking of the ship, the sight was one that will probably never be forgotten by those who witnessed it.



SINKING OF THE STEAMER A. EVERETT ON SAGINAW BAY, LAKE HURON.

Lake Freight Matters.

It is expected that a statement covering the amount of ore on Lake Erie docks will be made public next week. The summary will probably show an aggregate of ore of all kinds about equal to the stocks of a year ago. This is a condition that was hardly expected, but it is due almost entirely to the heavy stocks of non-Bessemer ores that are to be again carried over into a new year. The opinion of ore dealers that the total output of Lake Superior mines this year will hardly exceed 8,000,000 gross tons is based largely on their knowledge of these stocks of non-Bessemers, and notwithstanding the heavy engagements that have been made with vessels, it would seem now that this surplus of low grade ores is an absolute hindrance to an output much in excess of eight millions, unless extraordinary conditions arise to increase the consumption of Lake Superior ores in districts east of the Alleghenies. It is quite generally claimed that if it were not for the necessity of making up an assortment of non-Bessemer ores, there is now almost enough of such ores in stock to meet the requirements of an ordinary season, but of course much of it is not at all desirable and there will be considerable of the better class of non-Bessemers brought down.

An important item having reference to the whole freight situation that is only now being taken into account is the great reduction that will result in the carrying capacity of vessels if the low stage of water now noted in all parts of the lakes prevails throughout the season. This reduction in capacity will be especially heavy now, as it may amount to 200 or 300 tons per trip on each of the large number of big modern freight steamers engaged in the ore trade. This loss in capacity, together with the loss of practically two trips as compared with last year on account of the later opening, must figure up heavily in the aggregate.

A few additional contracts have been made the past week for carrying ore throughout the season from the head of the lakes at 80 cents and from Escanaba at 40 cents, and there has been quite a little chartering of vessels for single trips at 40 and 45 cents from Escanaba, 60 cents from Marquette and 75 cents from Duluth, Two Harbors and Ashland. Soft coal shippers are doing nothing in the way of freight contracts, and single loads are as scarce as they were before boats began to move.

Insurance Matters.

Notwithstanding the low rates of hull insurance afforded to all vessels of the A1 and A1½ classes, and especially steel vessels, through the disagreement of lake underwriters this spring, it is now a difficult task to cover even the better class of A2 vessels at any reduction from last year's high tariff of rates. The insurance companies are fighting very shy of risks that are at all undesirable. Not much can be learned as to the amount of tonnage covered in the deal made up between Brown & Co. and Smith, Davis & Co. of Buffalo, just before the disagreement of underwriters at the Detroit meeting. It will be remembered that the Buffalo people made a sharp move by offering to vessel owners generally, in advance of the announcement of a break among the insurance men, a 3½ per cent. rate on the liberal form of policy that now prevails on the best class of wooden risks. They scooped up quite a number of vessels, with which they had not previously been doing business, but the amount of tonnage involved is not known. It is said that in the scramble for business a few owners managed to cover some of their A2 steamers with the better boats at the 3½ per cent. rate.

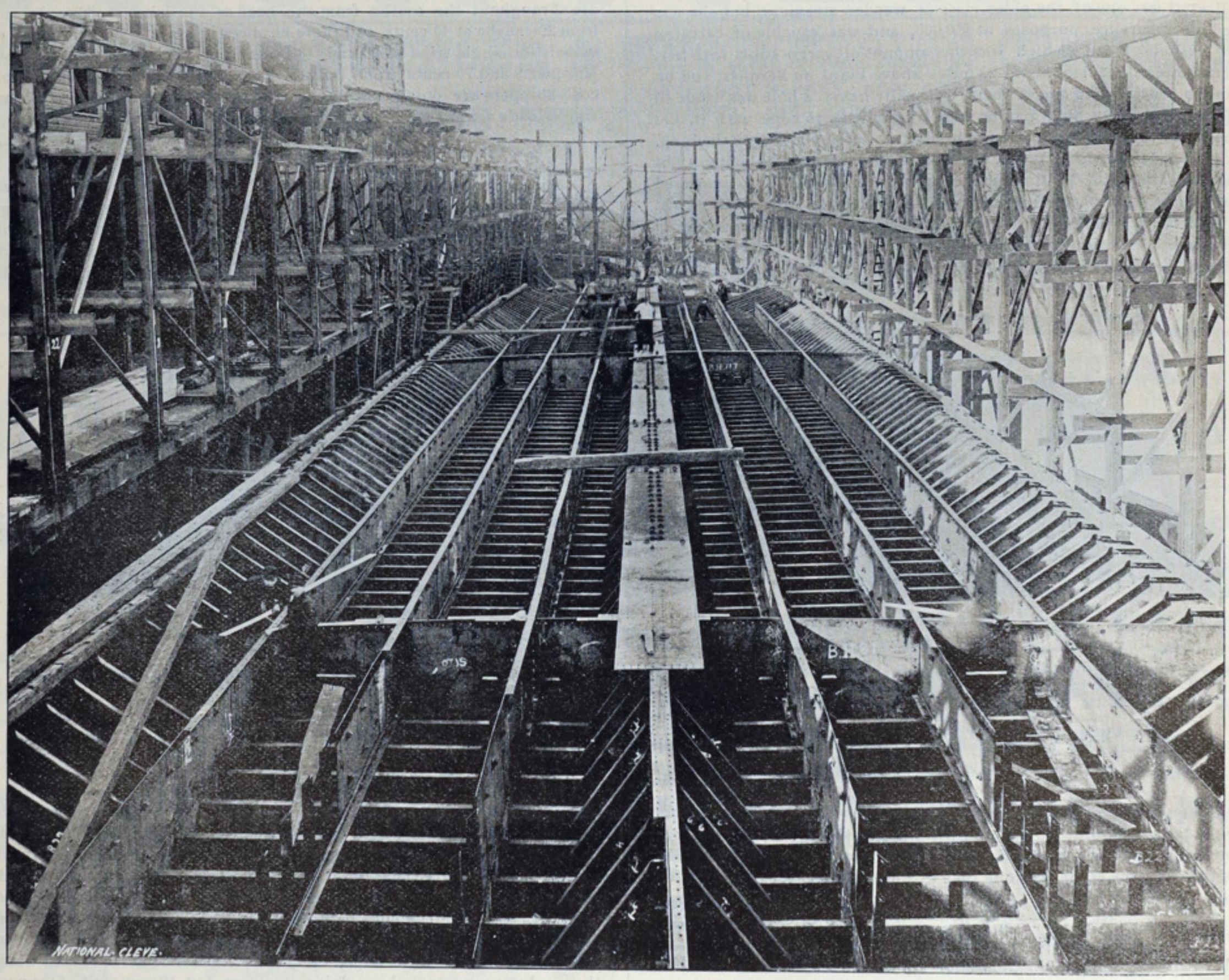
Rates on blanket contracts made each year with shippers of coal and ore, covering cargoes throughout the season, were first announced as 18 cents to and from Lake Michigan and 20 cents to and from Lake Superior, but these have since been publicly reduced to 16 and 18 cents respectively. There is considerable quiet cutting of rates in this business each year, and it is said now that some ore to come from ports on both lakes has been covered as low as 15 cents.

Great Britain has subsidized the big steamers Campania and Lucania which are to be held at the disposal of the admiralty in time of war. Twelve Atlantic liners, four of which are Cunarders, are now on the British subsidy list.

Light-houses of the world number more than 7,000. An exchange remarks that the keepers do not quarrel with their neighbors.

Channel System of Hull Construction.

A photo-engraving on this page illustrates, very clearly, the channel system of construction adopted in some of the largest steel freight carriers now building at South Chicago and Cleveland. The engraving was made from a photograph of the bottom of the steamer Yale, 396 feet over all, which is being built by the Cleveland Ship Building Co. for Robert R. Rhodes and others of Cleveland, and which was illustrated and fully described in the last issue of the REVIEW. The same system has been applied to the two 400-foot steamers Zenith City and Victory, as well as the Kearsarge and three barges, Marcia, Malta and Arcadia, all recently built or now building in South Chicago. The application of this channel shape to ship construction is the invention of Sinclair Stuart, surveyor for the United States Standard Register of Shipping, and its adoption in these ships is due mainly to the fact that vessels using it are, when other requirements are fully carried out, given the highest rating in the Standard register. The illustration shows more clearly than any description of the work that might be written how these channel shapes are used for main frames and floor plates, instead of angle iron and plates riveted together to form the desired shape.



CHANNEL SYSTEM OF CONSTRUCTION AS APPLIED TO FREIGHT STEAMER YALE, 396 FEET OVER ALL, BEING BUILT BY CLEVELAND SHIP BUILDING COMPANY.

Schlesinger's Settlement.

When stripped of the coloring given to it by "special" newspaper correspondents the story of Ferdinand Schlesinger's re-entrance into Lake Superior mining business is not particularly a sensation. He assumes control of the Dunn mine, not of his own choice, but as a result of a settlement forced by the Corrigan-Ives McKinney interests of Cleveland. When Schlesinger left Milwankee after the several mining failures, notably that of the Chapin, with which he was connected, he went to Mexico, and it was learned later that he had become interested in a gold mine at a place called El Conchino. In the meantime the firm of Corrigan, Ives & Co. of Cleveland, which was somewhat embarrassed on account of its dealings with Schlesinger, was enabled to pay up all indebtedness through the substantial business standing of individual members, and its business was taken up by the new firm of Corrigan, McKinney & Co. But the firm of Corrigan, Ives & Co. still held Schlesinger's paper in a large amount, and when it was found that he had in some way secured money enough to own a half interest with his father-in-law, Henry Stern of Milwaukee, in the Mexican gold mine, an investigation was begun, which resulted in the Mexican property being turned over entire to the Corrigan-Ives-McKinney interests. Schlesinger and his friends were given a return of the paper held by Corrigan, Ives & Co. and also the Dunn mine, with about 40,000 tons of ore which had accumulated at the mine. The Dunn property is now owned by Schlesinger's father-in-law but will, of course, be managed by Schlesinger. There is no truth in the story of his having secured interests in any other Lake Superior mines. The agency for the sale of Dunn ore has been placed by Schlesinger with M. A. Hanna & Co. of Cleveland. Mr. Corrigan and his associates in Cleveland undoubtedly made a careful investigation regarding the value of the Mexican gold mine, before concluding this arrangement with Schlesinger, but they have not parted with a very valuable property in the Dunn. The latter is a non-Bessemer mine, but may with care be worked to some advantage. It is claimed that shipments per month from the Mexican gold mine have never amounted in value, to less than $23,000 and that they have aggregated $73,000 in value while assays have shown not less than $59 and they have been as high as $2,000. Mr. Price McKinney of Corrigan, McKinney & Co. is now temporarily in charge of the gold mine.

LISTS OF MASTERS AND ENGINEERS OF LAKE VESSELS, TOGETHER WITH NAMES AND ADDRESSES OF MORE THAN A HUNDRED FIRMS AND CORPORATIONS CONTROLLING LINES OF FREICHT AND PASSENGER STEAMERS ON THE LAKES, MAY BE HAD IN PAMPHLET FORM FROM THE MARINE REVIEW, NO. 516 PERRY-PAYNE BUILDING, CLEVELAND, FOR 25 CENTS.

William Wilson.

The death of William Wilson of Cleveland, which occurred April 24, was announced in the last issue of the REVIEW. The Wilson family has been very closely associated with the development of lake commerce, especially on Lake Superior, and the life of William Wilson is for this and other reasons worthy of more than passing notice. He was the son of Thomas and Anne Reid Wilson, and was born fifty-eight years ago at Path-head, Fifeshire, Scotland. Thomas Wilson was an officer of the customs, and as such moved to the north of Ireland when William was but five years of age. There were at this time three other children—Isabella, the oldest, Annie, a twin sister to William, and Thomas, the youngest, who is now well-known as one of the leading vessel owners of the lakes. At sixteen, William decided to come to America, and after locating in Philadelphia he was instigative in causing the whole family, which by this time included three other daughters, Kate, Margaret and Mary Jane, to follow him to that city a few years later. Then, about

1850, he crossed the country to California, and was engaged on steamers trading between Sacramento and San Francisco. He returned to Philadelphia about the time the family had decided to move to northern Michigan, and he joined them in locating on the St. Mary's river, Sugar island, near Sault Ste. Marie. It was during the early years of Lake Superior navigation following this period that the family became generally known throughout the lakes, as Capt. Thomas Wilson was given command of some of the best passenger boats when a young man, and William with other members of the family became more or less interested in vessel property. Although Capt. Thomas Wilson moved to Cleveland about 1872, William remained at Sault Ste. Marie until thirteen years ago, when he accepted a position in the office of the Wilson Transit Co., assisting his brother, who is president and manager of that company. William Wilson was also the owner of considerable stock in the Wilson line. He leaves a wife, two sons and a daughter. Among business men his amiable disposition and unassuming manner were frequently remarked. He was modest and retiring and was an earnest Christian.

A paper on "Torpedo Boat Destroyers" by J. L. Thorneycroft and Sidney W. Barnaby, two of the foremost builders of fast vessels in Great Britain, was recently presented to one of the engineering societies. It was shown that since 1885, when it was decided to built boats 125 feet long and of 20 knots speed, the speed has been going on increasing until fully 29 knots has been reached, the improvements by which this has been effected being due to the water tube boiler and the introduction of steel in the construction of the engines, which has enabled the builders to very much increase the power without a corresponding increase of weight. The Boxer, one of the latest torpedo boat chasers, on the measured trial made 29.314 knots with an indicated horse power of nearly 5,000, and yet the total weight of machinery is only 115 tons. From the experience now gained by Messrs. Thorneycroft, they are of opinion that that the speed has now approached measurable distance of that which propulsions by screws depending upon the reaction of water becomes inefficient.

Young Men to the Front.

In several instances of late young men have been advanced to important positions in the different branches of lake shipping, and there is an evident disposition, especially among the large corporations, to recognize merit in the younger class of masters and office employes who have had practical training. A case at hand is that of Capt. W. W. Brown, who has just taken charge of the plant of the Cleveland Dry Dock Company, the oldest dock concern in Cleveland. The recognition accorded Capt. Brown is noteworthy from the fact that his new position was offered him without solicitation. The management of the Cleveland Dry Dock Company had taken note of his promotion some time ago by Pickands, Mather & Co., to command the steamer Kearsarge, one of the best boats controlled by that firm, and in fact one of the best freight carriers on the lakes. He had the respect and confidence of the sailing fraternity, as well as leading owners of vessel property, and was evidently looked upon as a young man who was in touch with all interests with which he was associated. Capt. Brown will undoubtedly meet with success in his new position. During sixteen years of sailing, a large part of which was spent in the Bradley employ, he gained a knowledge of ships and their repairs that will serve him well in the management of a dry dock, and he is anyhow of a progressive, business disposition.

CAPT. W. W. BROWN

New Flash Light Torch.

Pickands, Mather & Co., M. A. Bradley, W. D. Rees and two or three other managers of vessels in Cleveland have made purchases within the past few days of a flash light torch that will undoubtedly come into general use on the lakes, especially on sailing vessels and tow barges. With these large owners the torches are, of course, intended for use on barges. The torch is the invention of Charles L. Meyer of the Graham-Meyer Torch and Liquid Light Co., who was in Cleveland during the past week, and who is now making a trip around the lakes for the purpose of introducing it and establishing agencies. Cleveland purchasers who have examined the torch say that it is especially adapted for tow barges, on account of its cheapness and reliability, and the certainty of its being ready for use in event of accident that might separate a tow, or in case of necessity for giving a distress signal. The torch will very probably be adopted by the United States navy and also by the United States life saving service, as tests of it made before naval officials and other government officers have been very highly commended. Mr. Meyer had intended to invite a number of Cleveland vessel owners and masters to witness a test of his device in Cleveland but was prevented from doing so, on account of his desire to reach Chicago before the fleet wintering there had all left port.

The readiness with which the managers of the several big firms referred to have taken up the torch is a strong recommendation for it, but it has many features that recommend it as the only valuable article of its kind ever introduced aboard vessels. Kerosene or spirits of turpentine can be used with it, and it will burn steadily for 20 to 30 minutes, throwing a flame 3 to 5 feet high and requiring less liquid than any ordinary torch of the same size; or by one filling it can be flashed thirty or forty times at intervals of one to fifteen seconds. Wind, rain or spray will not extinguish the light, and the torch itself is practically indestructible. It is filled with asbestos, has a strong center draft, and will last for years, being ready for use at all times. It may be dipped into water and immediately relighted, and the stronger the wind the better it burns. The manufacturers, who have main offices at No. 89 Fulton street, Boston, have also blue, green and red burning liquids, the use of which will permit of a code of signals of any kind being made up by use of the torch. Among agents secured for the lakes are the Upson-Walton Co. of Cleveland and the H. Channon Co. of Chicago.

The rearrangement of the dining cars on the Nickel Plate road provides breakfast and dinner on the New York and Boston express No. 2 eastbound, breakfast and dinner on the fast western express No. 5, and dinner on No. 6. This newly established service not only accommodates the through passengers of that line more satisfactorily, but provides a better arrangement for its local patrons. May 11—234.

The Nickel Plate road offers one fare rates to designated Michigan points on May 7th account land seeker's excursion. Write for particulars. May 11—232.

Baltic-North Sea Canal.

The New York, Columbia, San Francisco and Marblehead are the naval vessels that will represent the United States during the celebration at Kiel in honor of the inauguration of the North Sea canal. The vessels will be under command of Rear Admiral Kirkland. In connection with this announcement, there is published an official consular report giving a description of the canal. The report says:

"The legislation for connecting the Baltic with the North sea was enacted in 1886. The first spadeful of earth inaugurating the work was turned by Emperor William I, at Holtenau, near Kiel, on June 3, 1887. The canal is 61.27 miles in length. It begins at Holtenau, on the Bay of Kiel, and terminates near Brunsbuttel, at the mouth of the River Elbe, thus running clear through the province of Schleswig-Holstein from northeast to southwest. Both openings are provided with huge locks. Near Rendsburg, there is a third lock connecting the canal with the old Eider canal. The medium water level of the canal will be about equal to the medium water level of Kiel harbor. At the lowest tide the profile of the canal has, in a depth of 20 feet 6 inches below the surface of the water, a navigable width of 118.11 feet, so as to allow the largest Baltic steamers to pass each other. For the navy, 72.18 feet of canal bottom are provided, at least 190.29 feet of water surface, and 27 feet 9 inches depth of water. The greatest depth for merchant vessels is 21 feet 3 inches. The estimated cost is $37,128,000. Two- thirds of the cost is defrayed by Germany, the remaining one-third by Russia. The time saved by a steamship sailing from Kiel to Hamburg via the canal instead of through the Skaugh (the strait between Jutland and Sweden), is estimated at 2½ days. The time of passage through the canal, including stoppages and delays, will be about thirteen hours. In time of peace, the canal is to be open to men-of-war, as well as merchant vessels of every nation, but in time of war, its use will be restricted to vessels of the German navy. Many vessels have been wrecked and many lives lost on the Danish and Swedish coasts, in waters which need not be navigated after the canal is opened to traffic. Its strategic importance to Germany will also be great, as it will place that country's two naval ports, Kiel on the Baltic, and Wilhelmshafen on the North sea, within easy access of each other.

Compressed Gas for Propelling Vessels.

In different parts of Europe, compressed gas has been used for the propulsion of small vessels, such as launches and other pleasure craft, and recently a company has been formed at Havre for the purpose of establishing a line of barges to ply on the Seine between that point and Paris that are to be propelled by gas engines, and are to carry their own supply of compressed gas. The gas is produced at a small gas works situated midway between the two places, where it is compressed to a pressure of about 1,400 pounds per square inch, and is stored in special gas holders. When the supply of gas on the barge is exhausted, it is quickly replenished by connecting it with the pipes leading to the storage tanks. The first barge to be fitted is an iron vessel having a length of 98½ feet, a breadth of 18 feet, and drawing 7 feet 4½ inches of water. The gross tonnage of the vessel is 300, but the quarters of the crew and the space occupied by the engine are so small that a cargo of 250 tons can be carried. The gas is stored in steel tubes having an outside diameter of 9.84 inch, a thickness of 3.1 inch and a length of 16.4 feet. Each tube weighs 715 pounds and will hold 777 cubic feet of gas at a pressure of 1,400 pounds per square inch. They were, however, tested at a pressure of 2,250 pounds. There are eighty of these tubes, and they are connected to each other by flexible tubes, the joints of which have been tested to the same pressure as the tubes themselves. In order to prevent accidents and economize space they have been placed on the captain's bridge, so that should any leakage occur there can be no danger, as the gas will escape directly into the atmosphere. The gas is expanded down to the desired pressure for the engine by a special apparatus. The engine is of the vertical two cylinder type, of about 40 horse power, with the cranks set at right angles. On one end of the shaft there is a fly-wheel used for starting the engine. On the occasion of a trial trip, when the vessel was loaded with eighty tons, a speed of about 6½ miles per hour was attained, with the engine running at 200 revolutions per minute, and the propeller worked well both ahead and astern.

Officers of the National Marine Engineers Beneficial Association recently presented Engineer-in-Chief George W. Melville of the navy with an elaborate certificate of admission to honorary membership. Letters containing expressions of great friendship passed between Commodore Melville and Mr. Geo. P. Wilson of Philadelphia in connection with the presentation of the certificate. Mr. Wilson was chairman of the committee appointed at the convention of the engineers in January last to prepare the certificate.

Rates are offered on the certificated plan by agents of the Nickel Plate road to Springfield, Mass., and Hartford, Conn., May 8th to 16th account Y. M. C. A. convention, and to Washington, D. C., May 9th to 17th account Southern Baptist Association. May 11—233.

Around the Lakes.

A petition is being circulated for the establishment of a life-saving station on Turtle island, Lake Erie.

The wooden schooner Granada, a vessel 225 feet long, was launched at the ship yard of Capt. James Davidson, West Bay City, Wednesday.

It will probably be late in July before the system of lights planned for Hay Lake channel is placed in operation.

Records regarding water levels of Lake Michigan show that this year is the first in fifteen years that the low water mark of December and January has continued through March.

Corsica shoal light-ship, foot of Lake Huron, has been placed in position. The vessel is anchored 1,000 feet farther north and 50 feet to the eastward of last year's location.

H. C. Farrel, Simon O'Day and M. Gering of Buffalo have purchased the steamer S. F. Hodge. She will trade between Buffalo and Lake Superior, stopping at intermediate ports.

Capt. M. T. Huntley, who was for a number of years a leading owner of harbor tugs in Toledo, died at his home in that place Monday. He was sixty-five years of age and had lived in Toledo forty-seven years.

Gen. Abbott, Major H. M. Adams and Capt. D. C. Kingman constitute a board of army engineers appointed Tuesday by Secretary Lamont to prepare plans for the extension of breakwater improvements at Buffalo.

The steel steamer Globe, owned by the Globe Iron Works Company of Cleveland, will be operated this season in the office of M. A. Hanna & Co., and will engage in the Lake Superior trade, carrying ore probably from Duluth.

Ore dock managers at all Lake Erie ports excepting Buffalo have fixed 13½ cents as the rate per ton for unloading ore from vessels. This rate is the same as was charged last year. The rate charged at Buffalo docks is a little higher.

About 450 men are now employed in and about the big dock and ship yard of the American Steel Barge Company at West Superior. One of the oil barges building for the Standard company is about ready to be tested. It will be several weeks before both boats are finished.

Edward Varian, who has been engaged in daily newspaper work in both Cleveland and Buffalo for a number of years past, is the editor of the new Buffalo publication called Lake and Canal. He intends to make the paper the organ of the canal interests of New York state, giving attention also to lake marine matters.

A dispatch from Sault Ste. Marie, Ont., says there is little hope now of the Canadian canal being open for the passage of vessels before June 1. If this date of opening is as far from being correct as the several that have been named in the past, it may be well into the close of the season before the canal is entirely ready for business.

Capt. W. S. Mack and William Becker of Cleveland, who have for some time past been figuring with Capt. Thomas Wilson for the purchase of the schooner Wadena, closed the deal a few days ago. The price was $30,000. The Wadena was built by the Quayles of Cleveland in 1887. She carries about 1,600 tons from Lake Superior and will tow with the steamer V. H. Ketchum.

The tug Zenith, recently built by E. W. Heath of Benton Harbor for W. H. Singer of Duluth, will rank among the best wooden harbor boats on the lakes. She measures 95 feet long, 20 feet beam and 12 feet deep. Her engines are fore and aft compound, with cylinders 18 and 36 inches by 30 inches stroke. She has a hydraulic steerer and a steam windlass aft. The propeller is 9 feet in diameter and the boilers measure 9 by 14 feet, to carry 145 pounds of steam. Cabins are finished in hardwood.

Reports of lunar rainbows are becoming quite numerous since the REVIEW referred to one seen on the lakes recently. Capt. Ben Tripp writes that he saw one on Lake Superior, some time ago, while master of the steamer Ontario. He also saw four, he says, in the tropics in the month of January, 1861, while on a voyage from Liverpool to Brazil, and one in the month of April on the return voyage to Liverpool. He was at that time sailing before the mast on the brigantine George Laidlaw.

During the week ending April 20, official numbers were assigned to the following new steam vessels of the lakes (there were no new sail vessels) by the bureau of navigation: Linden, Port Huron, Mich., 894.22 tons gross, 708.90 net, No. 141,370; Zenith, Duluth, Minn., 112.16 tons gross, 56.08 net, No. 28,127; Helen, Detroit, Mich., 26.04 tons gross, 13.02 net, No. 96,290. The tonnage of the schooner Granada, launched a few days ago by Capt. James Davidson of West Bay City, is 1,753 gross and 1,685 net.

Capt. Galvin, supervisor of steam vessels with headquarters at Buffalo, has been advised by James Dumont, supervising inspector-general, that local inspectors may, upon due application in writing from the owners of Canadian vessels, inspect such steamers at Canadian ports on Lake Ontario. All actual expenses of such inspection, incurred whilst outside of the United States, must be collected from the agents or owners of Canadian steamers. In obeying these instructions the inspectors must be careful to neglect no domestic steamers.

A Twenty-Mile Boat.

The only matter of detail not yet fully decided regarding the new side-wheel steamer to be built by the Detroit Dry Dock Company for the Cleveland & Buffalo Transit Company has reference to an allowance of $6,250 for a guarantee of 20 miles speed. The order as already placed with the dry dock company calls for Howden hot draft, Sickles valve gear and other attachments that will insure 20 miles at all times in regular service, and this extra allowance, which will be acted upon at a meeting of the stockholders of the transit company, and which will very probably be granted, is simply for the purpose of giving absolute assurance of the speed referred to. Of course it is expected that the boat will make better than 20 miles on special runs. The ship entire, with all specialties intended for speed, is to cost the Cleveland & Buffalo company $342,000. She is to be 308 feet over all, 296 feet on the water line, 40 feet 6 inches moulded beam and 17 feet depth. The main difference between the new steamer and the big steamers of the Detroit and Cleveland line will be in extra length of 14 feet and greatly increased power. Her beam engines will have a low pressure cylinder of 80 inches diameter and a stroke of 12 feet. There will be but one large smokestack. Boilers will be cylindrical, six in number, and there will be a feed water heater of sufficient capacity to condense from all of the auxiliary engines, some sixteen in number. Cabins will contain about 160 staterooms and in addition single berths will be arranged in the forward part, so that provision may be made for sleeping about 600 passengers. The boat's equipment will include an electric plant of 1,000 to 1,200 lights capacity, together with electric call bells and all other appliances now found in the best modern passenger steamers.

Bulkheads in Steel and Iron Ships.

Since the loss of the German steamer Elbe, a great deal has been written in support of the argument that an increase in the number of watertight sub-divisions in ships is the only means of absolute safety against the results of collision. Of the Atlantic liners, the Paris and New York have no less than fifteen bulkheads of various kinds, while the White Star liners Majestic and Teutonic have about the same number. The Lucania and Campania have eighteen transverse bulkheads and one center line bulkhead. But there are few ships afloat that are considered unsinkable on account of watertight sub-divisions of this kind. The Elbe had eight bulkheads, which is the general number in ocean-going passenger boats, but it is probable that in vessels of her class hereafter the number will be advanced to possibly twelve or fourteen, and most of them doubtless will be carried to the upper deck with as little communication between as possible. But there is no law in any of the maritime countries that aims at a system of bulkheads to make a ship unsinkable. Great Britain has given the subject a great deal of attention, but a Board of Trade committee reported a short time ago that it would be fallacy to suppose that what can be done with big, costly passenger ships of 500 feet length, like the Paris, Teutonic, Campania and others, can be equally well effected with all shorter vessels. This same committee, considering the question of "how a ship might float in moderate weather with any two adjoining compartments in free communication with the sea," came to the conclusion that only passenger steamers exceeding 425 feet in length, together with cross-channel passenger steamers irrespective of size or length, could be so sub-divided without greatly impairing their value for commercial purposes.

Although all steamers, on the lakes as well as in ocean service, have some bulkheads, and some in ocean passenger service have many, they are, as a rule, distributed in such a way, or are so finished with their tops below the water level, that for flotation purposes, after perforation of the outer skin, most of them are practically useless.

Gas Buoys Still Promised For the Lakes.

Commander Geo. F. F. Wilde, naval secretary of the light-house board, writing to Senator McMillan regarding gas buoys for the lakes, says:

"The board recognizes the necessity of gas buoys, and certainly made every effort to impress both committees of congress that they were indispensable. Last year we had $385,000 for buoyage. The cyclones of last year and the ice of this winter caused absolute loss of so many ordinary buoys, that much of the appropriation must be expended in replacing these. And having this in view, the board asked for $450,000. But should gas buoys be bought from, and under this appropriation, then $500,000 would be required. Congress gave only $415,000, or $25,000 less than the board asked for the regular and ordinary buoyage expenses. The board is ready and willing, indeed most earnestly so, to supply every possible aid to navigation. But, if funds are not appropriated, we manifestly cannot either gratify the wishes of interested people, or our own desire to make our buoyage system perfect. I shall strain our limited resources to purchase six gas buoys for the lakes, and rely upon the next congress to relieve us if we have a deficiency, for I recognize the absolute necessity of this aid to lake navigation."

Ore Trimming Charges.

Although some labor difficulties have been encountered at Marquette and Escanaba in establishing a uniform charge of 2½ cents for trimming ore at all upper lake shipping ports, it is probable that the Lake Carriers' Association will succeed in fixing that figure as the general rate, as it would be manifestly unfair to pay 2½ cents for this work at one port and 3 cents at another. Last year 2½ cents was paid at all ports excepting Two Harbors and Escanaba. J. L. Greatsinger, president of the Duluth & Iron Range Railroad Co., has advised Cleveland ore dealers that the 2½-cent figure would be established at Two Harbors this season, and with so much accomplished towards a uniform charge it is, of course, quite probable that the opposition of the trimmers at Escanaba and Marquette will be met with a very determined fight on the part of the vessel owners.

Another Book of Sailing Directions—New Pilot Chart.

Part 3 of the sailing directions for the lakes, published by the hydrographic office, is in print. This third part of the work takes in Lake Huron, Straits of Mackinac, St. Clair and Detroit rivers and Lake St. Clair. It is a little smaller than the books covering Lakes Superior and Michigan, which preceded it, but a supplement to this part, which will be published a little later, will give the latest sailing directions and other information regarding Georgian bay. The hydrographic office is at work on a new pilot chart of the lakes, which will contain a great deal of information that was unthought of at the time of publishing the last chart. The MARINE REVIEW has the agency for the sale of all publications issued by this branch of the government service.

Depth of Lake Superior.

In an article about Lake Superior published last week, the insertion of an extra cipher caused the depth of the big lake to appear as 10,008 feet, instead of 1,008 feet. The error was plainly one of typographical kind, as the depth of the lake was twice correctly referred to in the same article in fathoms. And then, too, it is well known that although Lake Superior is the largest body of fresh water in the world, its depth is not greater than that of Lake Michigan. But Lake Michigan has an average length of only 320 miles and an average width of sixty-five miles, with an area of 22,400 square miles. The surface of Lake Superior covers 32,166 square miles.

Wanted—An Efficient Fog Signal System.

The Maritime Register of New York is evidently of the opinion that there is fame in store for the inventor of a simple but efficient system of fog signals. Its editorial columns contain numerous notes on the subject. Following is one of the latest:

"Wanted, a fog signal system of the utmost simplicity combined with the utmost efficiency. An attempt at the chromatic scale or a telegraphic code in a fog signal will not be considered. An elaborate system that will give the exact position of a vessel, with details of her voyage, is not expected. As seamen, as well as highly educated and trained officers, must use the signals, it is suggested that simplicity be the first consideration. It is urged that simplicity and a code that will really be indicative of the position of a vessel can not be combined. As to this it may be said that it is not to be expected that the dangers of fog can ever be entirely eliminated."

It has been decided by the naval authorities to give the torpedo boats authorized by the last congress a maximum horse power of 3,500 in order to obtain the speed of 27 knots required under Secretary Herbert's decision. This will necessitate the placing of three boilers in each of the boats and an increase in the size of their engines. They will have twin screws. In other respects the plans will be similar to those for the torpedo boats, the contract for which has just been placed with the Columbian Iron Works, only the plans will, of course, be somewhat increased in order to make up for the greater displacement of the new vessels. The bunkers of the new craft will be made to hold forty tons of coal. It is thought that quarters for both officers and crew must of necessity be greatly cramped, on account of the increase in machinery and boiler space demanded for the power specified.

As a result of a meeting held in Cleveland Thursday, a committee of the Lake Carriers' Association, made up of representative owners from leading lake ports, will in a few days meet the hard coal shippers of Buffalo and endeavor to bring about a settlement of the fight that is being made against abuses in the fueling business at that port. Vessel owners feel that they have already practically secured a victory, and they have held together so well that they are of the opinion that the matter has now reached a stage that will enable them to secure favorable terms from the shippers.

COPIES OF THE LATEST CHARTS OF GEORGIAN BAY HARBORS MAY BE HAD FROM THE MARINE REVIEW, 516 PERRY-PAYNE BUILDING.

MARINE REVIEW

DEVOTED TO THE LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 516 Perry-Payne building, Cleveland, O.

SUBSCRIPTION—$2.00 per year in advance. Single copies 10 cents each. Convenient binders sent, post paid, 75 cents. Advertising rates on application.

The books of the United States treasury department contain the names of 3,341 vessels, of 1,227,400.72 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons and over that amount on the lakes on June 30, 1894, was 359 and their aggregate gross tonnage 634,467.84; the number of vessels of this class owned in all other parts of the country on the same date was 316 and their tonnage 642,642.50, so that half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1894, was as follows:

Class.	Number.	Gross Tonnage.
Steam vessels	1,731	843,239.65
Sailing vessels	1,139	302,985.31
Canal boats	386	41,961.25
Barges	85	39,214.51
Total	3,341	1,227,400.72

The gross registered tonnage of vessels built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

	Number.	Net Tonnage.
Year ending June 30, 1890	218	108,515.00
" " " 1891	204	111,856.45
" " " 1892	169	45,168.98
" " " 1893	175	99,271.24
" " " 1894	106	41,984.61
Total	872	406,976.28

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC.

(From Official Reports of Canal Officers.)

	St. Mary's Falls Canal.			SuezCanal.		
	1894.	1893.	1892.	1894.	1893.	1892.
No. vessel pass'ges	14,491	12,008	12,580	3,352	3,341	3,559
T'n'ge, net registd	13,110,366	9,849,754	10,647,203	8,039,106	7,659,068	7,712,028
Days of Navigat'n	234	219	223	365	365	365

Entered at Cleveland Post Office as Second-class Mail Matter.

ALTHOUGH differing in some respects with the views on shipping questions held by William W. Bates, ex-commissioner of navigation, the REVIEW has always been of the opinion that Mr. Bates' public utterances were honest expressions of his convictions. There was nothing of a pessimistic or petty nature in them, and on this account we are surprised to find now, after leaving the office of commissioner of navigation, that he should find fault with credit being ascribed to the present commissioner for accomplishing reforms that have long been sought in the office. Mr. Chamberlain had influence with the administration and with congress during the last session, and Mr. Bates and other men who have held the office of commissioner of navigation should rejoice in finding that this influence was sufficient to cause changes to be made in laws that were for a long time objectionable to the shipping interests.

NO MATTER what may be the outcome of the effort being made by the vessel owners to overcome exorbitant prices and other abuses that have characterized the fuel business of Buffalo, the chief officers of the Lake Carriers' Association may feel that they have done their full duty in the matter. Ever since the fuel question was taken up at the last annual meeting of the association in Detroit, President Livingstone and Capt. James Millen of Detroit, together with Messrs. Brown and Keep of Buffalo, Capt. McKay, Harvey D. Goulder and James Corrigan of Cleveland, have been constantly carrying on a system of correspondence and planning, in consultations among themselves and with weak-kneed owners, for the success of this movement. They have given up time and energy to the work, and the effort they have made can hardly be appreciated by members of the association who have not occasion to become aquainted with the details of its affairs.

ALTHOUGH it is not expected that the Nicaragua canal, if undertaken by the United States government, will be completed for commerce until 1907, the project will undoubtedly attract even more attention upon the opening of the next congress than has been given to it in the past. The report of the government commission of engineers, who are now about to leave New York on the U. S. S. Montgomery, to make an official survey of the canal route, will undoubtedly be favorable to the measure which passed the senate in the last session, guaranteeing the bonds of the canal company by the government and making it purely an American enterprise. This commission expects to reach Lake Nicaragua early in the present month and finish its survey some time in June, so that the whole matter, which has the support of the president, will be in readiness long before the opening of the next congress.

COMMISSIONER OF NAVIGATION Chamberlain seems to possess the good quality of sticking to an effort once begun for changes in his department of the government service that are recommended by vessel owners. When the White law providing certain changes in lake navigation rules was passed, a few months ago, Mr. Chamberlain promised to join in an effort to have the Canadian government adopt similar laws for the navigation of Canadian vessels on the lakes. Mr. Chamberlain had a conference in Washington, a few days ago, with Hon. John Riley, United States consul-general at Ottawa, and has succeeded in interesting that gentleman in the proposition to have the dominion parliament pass a law similar to the White law.

THE British board of trade has certainly shown a very narrow spirit in forbidding its officers the right to discuss engineering subjects, even in meetings of technichal societies, organized on the broad principle of disseminating useful knowledge. But this hindrance to freedom of speech on scientific subjects is not alone confined to the board of trade in Great Britain. It is found in other branches of the government that pertain to shipping. It is a pleasure to note, however, that the leading journals of the country are denouncing this policy, and in doing so they point to the freedom with which our own navy gives out any and all information that may lead to advancement in the science of ship building

Lake Levels Question.

Editor MARINE REVIEW—In your issue of the 18th inst., I noticed a sketch of the Lime-Kiln crossing and an article by Mr. Richard P. Joy on the "Lake Levels Question." I do not agree with his statement that for some years the level of the lakes has been constantly lowering, owing to the deepening and widening of the channel at said locality. Observations of the annual water level curves have been made for the past fifty-nine years, and during that time we have had periods of high as well as low water, the stage of the water having been highest in 1838 and lowest in 1847, before any improvements had been made. This variation will continue for all time to come. If the rainfall on the water-sheds and lake surface of Lakes Superior, Michigan and Huron—which are the supply basins for the Detroit river—is great we will have high water; if it is the reverse, the stage of the water will be low. The discharge of the Detroit river is 15,000,000 cubic feet per minute when the water is at zero.

In 1880, when the work of improvement of the Detroit river at the Lime-Kiln crossing was under progress, I made observations of the direction and velocity of the current at that locality, and in 1890, after the channel had been completed, I again made observations, the result recorded being as follows:

	Average velocity.
1880. Over the projected channel	2.42 miles per hour
1890. In the new channel	2.15 " "

The average velocity of the current in the Detroit river is two miles per hour. The fall from the Lime-Kiln crossing to Lake Erie is 1¾ inches, and if the level of this lake could be raised 2½ inches there would be no current at the crossing.

The material removed consisted of solid rock, blasted, dredged and dumped a distance to the west of the channel, where a dam 840 feet in width and 7 feet or more in height was built, making a face of 5,880 square feet. The improved channel is 440 feet in width, and the average excavation amounts to 3 feet, or 1,320 square feet in depth.

Mr. Joy's theory is not altogether new. About fifteen years ago, an old farmer of Grosse Isle told me that the improvements at the Lime-Kiln crossing would lower the level of the water. I am, however, convinced that this has not been the case; yet, in the future, the stage of the water may be thus affected in consequence of the clearing of the forest, particularly in the mountain regions.

H. KALLMAN,
U. S. Asst. Engineer.

Detroit, Mich., April 30, 1895.

THREE BOOKS OF SAILING DIRECTIONS, ONE COVERING LAKE SUPERIOR AND THE ST. MARY'S RIVER ANOTHER COVERING LAKE MICHIGAN AND THE STRAITS OF MACKINAC, AND A THIRD TAKING IN LAKES HURON AND ST. CLAIR WITH DETROIT AND ST. CLAIR RIVERS, ARE NOW OFFERED FOR SALE BY THE HYDROGRAPHIC OFFICE. THESE BOOKS ARE PARTS OF A WORK THAT WILL COVER THE ENTIRE CHAIN OF LAKES. THEY CONTAIN CHARTS OF LEADING CHANNELS AND HARBORS, AND MAY BE HAD FROM THE MARINE REVIEW, 516 PERRY-PAYNE BUILDING, CLEVELAND, AT $1 EACH.

Illustrated Patent Record.

SELECTED ABSTRACTS OF SPECIFICATIONS OF A MARINE NATURE—FROM LATEST PATENT OFFICE REPORTS.

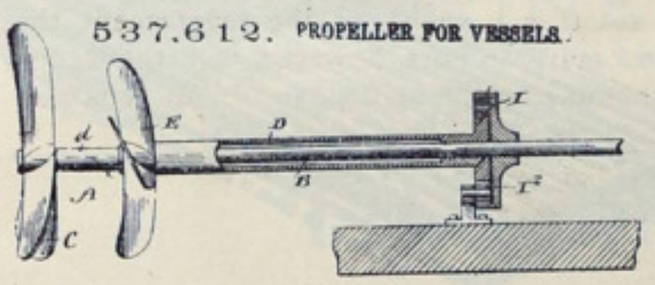
537,612 **Propeller for Vessels.** Levi L. Leathers, St. Albans, Me. Filed June 25, 1894. Serial No. 515,686.

Claim—A propeller for boats, comprising two bladed wheels of different relative diameters with respect to each other, arranged in the same axial line and adapted to be operated in opposite directions, the smaller wheel being arranged on a hollow shaft in front of the larger wheel and provided with a greater number of blades than said larger wheel, a shaft to which the rear or larger propeller is secured provided with an internally toothed gear wheel, a spur wheel on the hollow shaft and a supported pinion interposee between the spur and gear wheels.

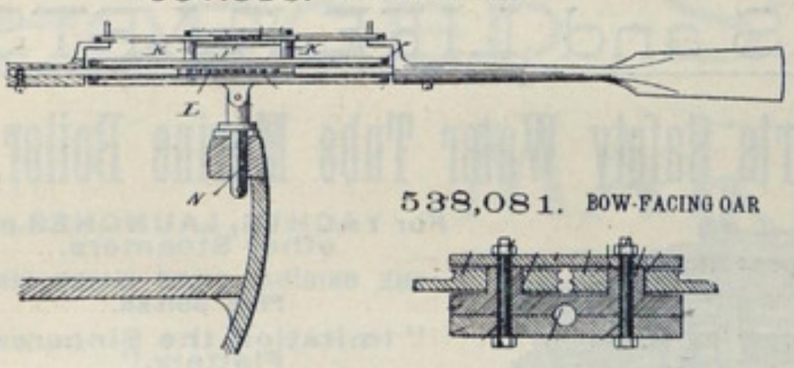
537,616. **Bow-Facing Oar.** Reinhold H. Parr, U. S. Army. Filed March 23, 1894 Renewed March 12, 1895. Serial No. 541,486.

Claim—The combination in a bow-facing oar, of the frame carrying the pivoted intergearing segments, the oar handle and oar blade pivoted respectively to pintles forming part thereof, the intergearing segments pivoted above the before mentioned segments to the frame and having slotted reduced portions and the brackets at the respective inner ends of the handle and oar blade shaft working loosely in the slots, whereby the oar may be feathered

537,612. PROPELLER FOR VESSELS.

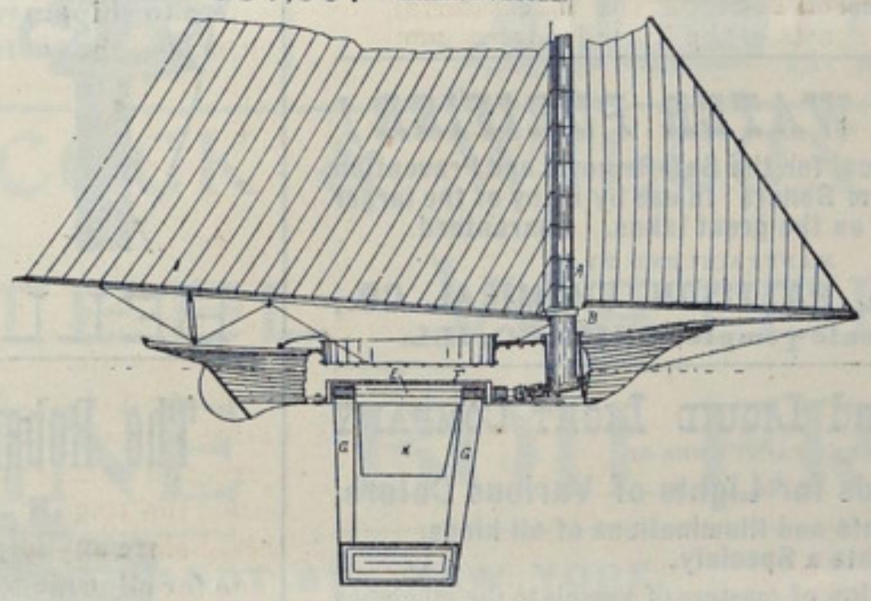


537,616. BOW-FACING OAR.

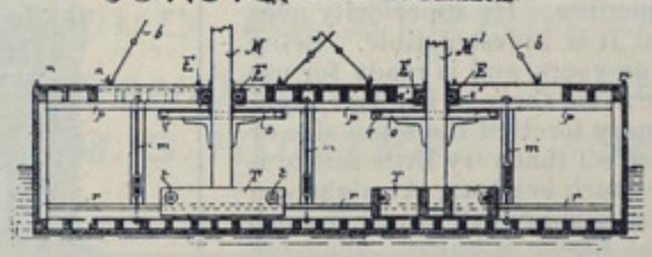


538,081. BOW-FACING OAR.

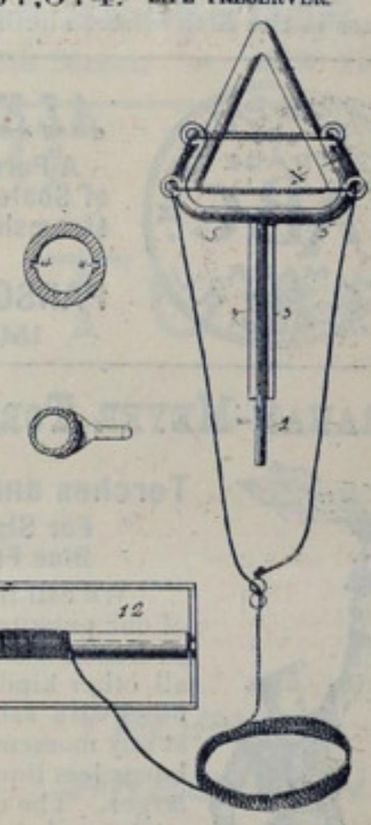
537,667 SAILING-VESSEL.



537,874. FLOATING DERRICK.



537,674. LIFE-PRESERVER.



537,667. **Sailing Vessel.** Douglas Beardsley and Frank A. Robinson, Auburn, N. Y.; said Robinson assignor to said Beardsley. Filed Dec. 5, 1894. Serial No. 530,878.

Claim—The hull of a sailing vessel provided with a lateral resistance plate extending below the keel, in combination with the mast, A, pivotally secured to said hull, and the ballast, H, also pivotally secured to said hull, said mast and ballast being secured together by the shafts, C and E, so as to remain in the same longitudinal plane, while they may vibrate laterally with respect to said hull.

537,674. **Life Preserver.** Michael Collins, North Attleborough, Mass. Filed March 15, 1894. Serial No. 503,721.

Claim—A life preserver consisting of a float, a rod provided with flanges adapted to fit in a gun barrel, said rod having arms to which the float is secured, integral rings on the arms and a shore line secured in the rings.

537,874. **Floating Derrick.** John E Walsh, New York, N. Y., assignor to Mary A. Walsh, same place. Filed Nov. 17, 1894. Serial No. 529,145.

Claim—In a floating derrick, a scow having two slots provided in its deck, two masts in said slots in an upright position, and means for adjusting and securing the same upon said scow in different positions, as and for the purposes herein shown and described.

538,081. **Bow-Facing Oar.** Joseph P. McFarland, Baltimore, Md. Filed Jan. 25, 1895. Serial No. 536,245.

Claim—A boat oar having, in combination, a handle and blade each being a separate piece and each having a circular joint-head provided with a central hole *c*; a plate F, provided on its surface with two integral bosses *c'*, each having a hole *g*—said bosses taking into the said central holes of the joint-heads and serving as the pivots on which the handle and blade turn; a plate H, covering said joint-heads and resting against said pivot-bosses; bolts *i* through the said cover plate and the holes in the pivot-bosses and securing the two plates together; means connecting the said joint-heads of the handle and blade so as to insure pivot-movement of both of said parts in the same direction, and means to enable the oar to be oscillated.

Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store and afloat at the principal points of accumulation on the lakes on April 27, 1895:

	Wheat, bushels.		Corn, bushels.
	In store.	Afloat.	In store.
Chicago	22,524,000	58,000	4,344,000
Duluth	12,861,000	85,000	.....
Milwaukee	606,000	.....	.....
Detroit	806,000	.....	161,000
Toledo	1,305,000	.....	190,000
Buffalo	1,717,000	.....	201,000
Total	39,819,000	143,000	4,896,000

Cargo and Speed Records—Lake Freight Steamers.

Iron ore—S. S. Curry, Hawgood & Avery Transit Company of Cleveland, 4,569 gross or 5,117 net tons, Escanaba to South Chicago; Maritana, Minnesota Steamship Company of Cleveland, 4,260 gross or 4,771 net tons' Escanaba to South Chicago; Selwyn Eddy, Eddy Bros. of Bay City, Mich., 3,897 gross or 4,364 net tons, Escanaba to Ashtabula; Kearsarge, Interlake Company of Cleveland, 3,718 gross or 4,164 net tons, Escanaba to Cleveland.

Grain—Selwyn Eddy, Eddy Transportation Company of Bay City, 130,820 bushels of wheat, Detroit to Buffalo; Centurion, Hopkins Steamship Company of St. Clair, Mich, 152,000 bushels of corn, Chicago to Buffalo; S. S. Curry, Hawgood & Avery Transit Company of Cleveland, 246,673 bushels of oats, Chicago to Buffalo.

Coal—S. S. Curry, Hawgood & Avery Transit Company of Cleveland, 4,535 net tons bituminous, Conneaut to Gladstone; Selwyn Eddy, Eddy Bros. of Bay City, Mich., 4,252 net tons anthracite, Buffalo to Milwaukee.

Speed—Owego, Union Line of Buffalo, Buffalo to Chicago, 889 miles, 45 hours and 16 minutes, 16.4 miles an hour; Centurion, Hopkins Steamship Company of St. Clair, Mich., Buffalo to Duluth, 997 miles, 67 hours and 50 minutes, 14.7 miles an hour.

Society of Naval Architects and Marine Engineers.

A notice from Washington L. Capps, secretary and treasurer of the Society of Naval Architects and Marine Engineers, says the next general meeting of the society will take place in New York City on Nov. 7 and 8. A list of papers to be read and other particulars will be sent to members as soon as arrangements have been made. Copies of the transactions of the last meeting are now being sent to members by express. Copies of he constitution and by-laws and blank applications for membership can be obtained upon application to the secretary.

"ROPER'S LAND AND MARINE ENGINES," BOUND IN MOROCCO WITH FLAP AND POCKET, WILL BE MAILED TO ANY ADDRESS FOR $3 50 SENT TO THE MARINE REVIEW, CLEVELAND, O.

Trade Notes.

An electric plant of 125 lights, with direct connected engines and dynamos, will be fitted in the Graham & Morton Transportation Company's steamer Lawrence by the Fisher Electrical Manufacturing Company of Detroit.

Capt. Geo. Simpson, compass adjuster, arrived from the east last week and has left for Sault Ste. Marie, where he will be located this summer. He has an order to take care of the compasses of the largest fleet on the lakes.

The electric equipment of the wrecking tug Swain, which is being installed by the Wolverine Electric Co. of Detroit, will consist of a 7,000 candle power search light, 40 incandescent lights and four arc lights, one of the latter having 150-foot cables to permit of its use on wrecks.

Wildman Brothers, the expert marine boiler builders, formerly of East Saginaw, Mich., are now located at 87 to 93 N. Clinton street, Chicago, Ill. They have few equals, and no superiors, in that particular line, having been in the business for the past 25 years, and many of the finest boilers on the Great Lakes and Atlantic and Pacific oceans were built by this well and favorably-known firm.

Dennis Simmons, president of the Dennis Simmons Lumber Co. of Williamston, N. C., writing to H. G. Trout & Co., Buffalo, makers of propeller wheels, says: "Our steamer is engaged in a service that is very hard on wheels but the captain tells us that the wheel you furnished us is highly satisfactory. The boat has been in service obout four years and yours is the fifth wheel she has had."

A very interesting sight witnessed by a representative of the REVIEW recently, was in the chain department of the P. Hayden S. H. Co., Columbus, O. The men were busy at work on large orders for anchor chains and heavy rafting chains for lake use. The forging of heavy cables was especially interesting. Three, and sometimes four, strikers are used at each forge. The company had ready for shipment about 100 tons of 1¼" rafting chains, and several sets of anchor chains. Among the latter were some 1¾" stud link made for Capt. James Davidson, West Bay City, on his order for five sets of cables. These were made in 75-fathom shots. Some 1¾" stud link cable chain, on an order from the Chicago Ship Building Co. for four sets of cables, was made in 90-fathom shots. The Hayden company has orders for about twenty-five sets of cables for such builders as the American Steel Barge Co., Chicago Ship Building Co., Capt. James Davidson, Detroit Dry Dock Co, Craig Ship Building Co., Cleveland Ship Building Co., and others. The company uses standard hydraulic testing machines for making all tests.

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For Signal Lights and Illuminations of all kinds.

Blue Flash Lights a Specialy.

We call the attention of masters of vessels to the efficiency of our patented flare-up or flash light torch. It can be used with kerosene or spirits of turpentine. Its superiority over all other kinds of torches is that it is indestructible. Being filled with asbestos, it will last for years, and is ready for use at any moment. It gives a white flame three to five feet high, burns less liquid than any ordinary torch of the same size or larger. The combustion is so perfect that very little smoke is made, and the flame is therefore much brighter. At night you can wigwag with this torch. Rain or spray will not extinguish it, and the stronger the wind the better it burns. We have also a **Blue, Green and Red Burning Liquid,** to make any code of signals required. Yachtsmen will find this of immense value for signaling.

Lake Agents: { The Upson-Walton Co., Cleveland, O. / H. Channon Co., Chicago, Ill.

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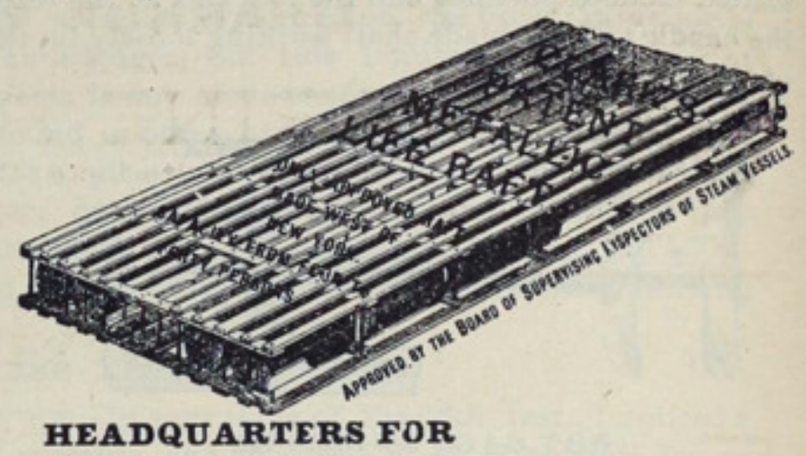
155 to 183 River St., CLEVELAND, O.



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BELLS and LIFE RAFTS.

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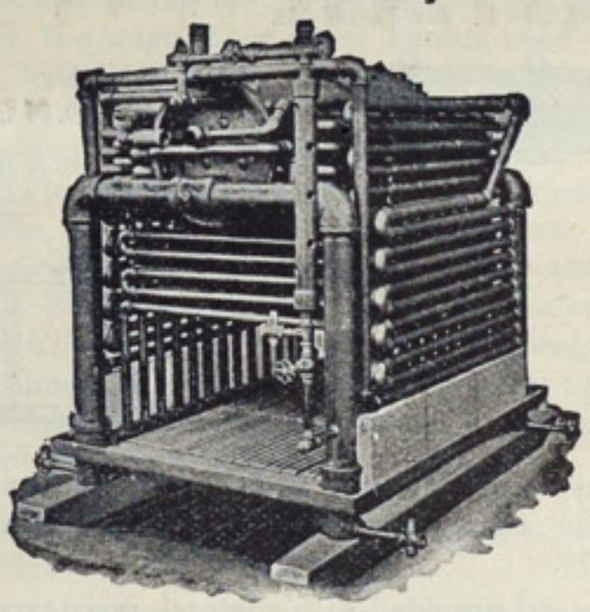

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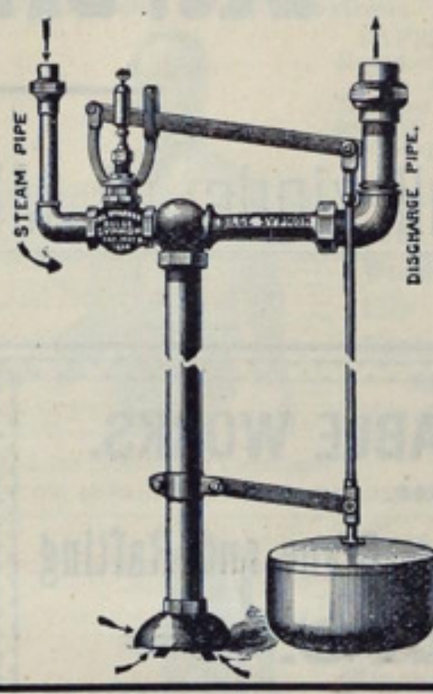

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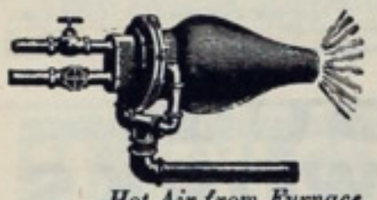

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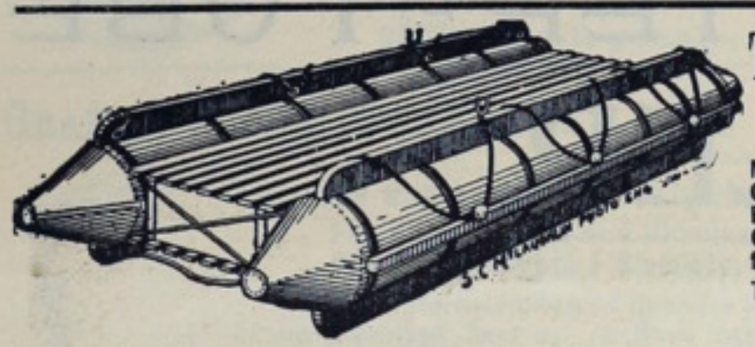

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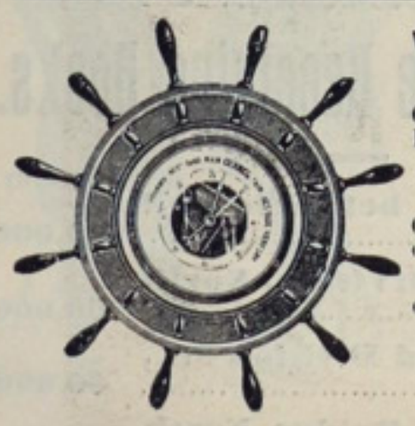

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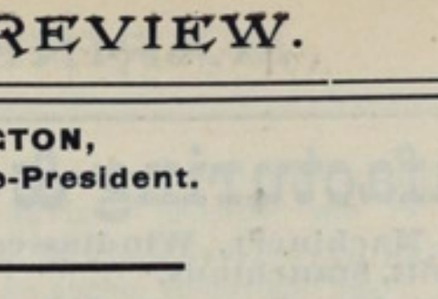

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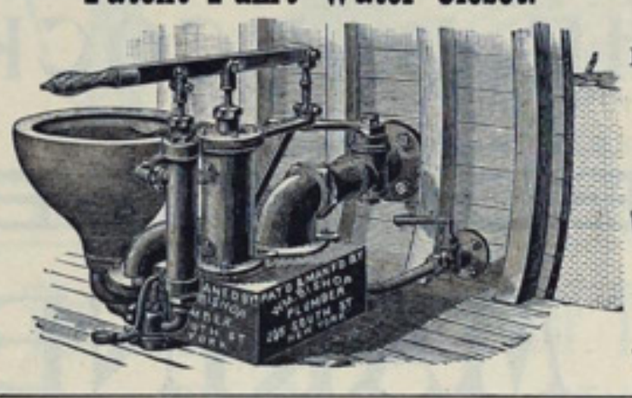

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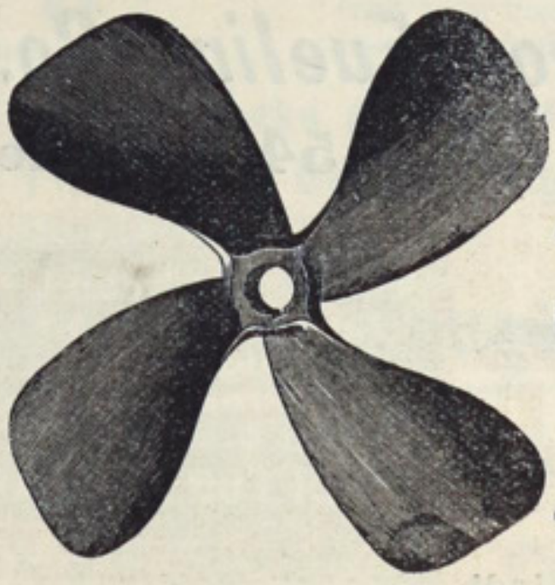

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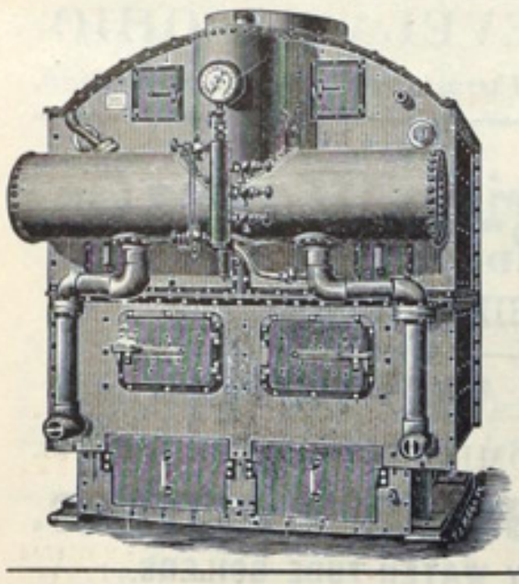

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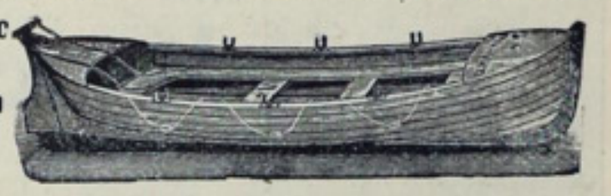

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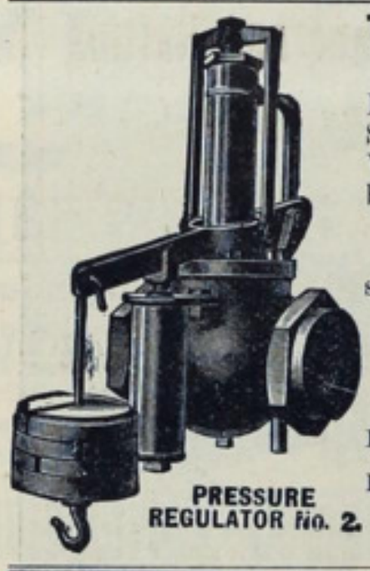

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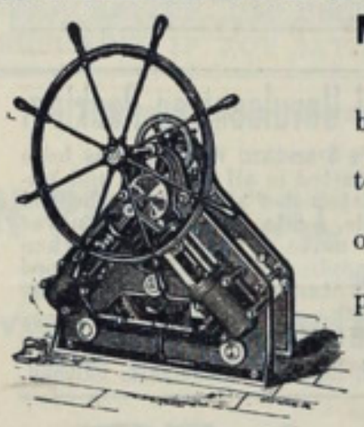

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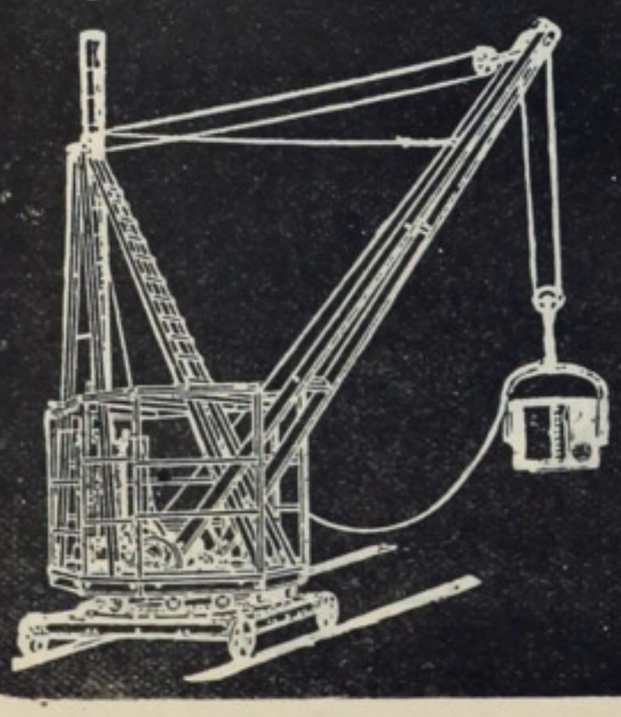

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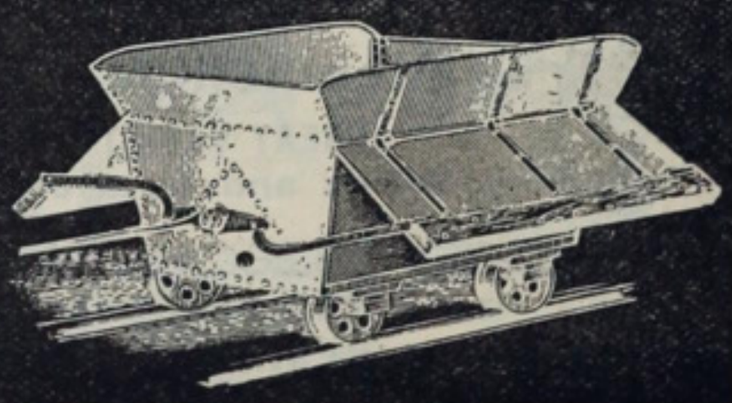

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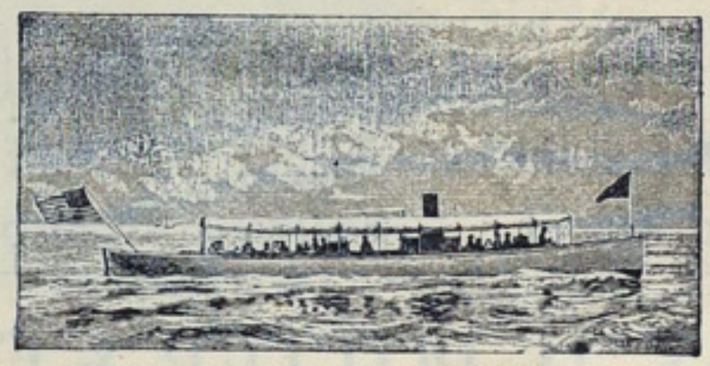

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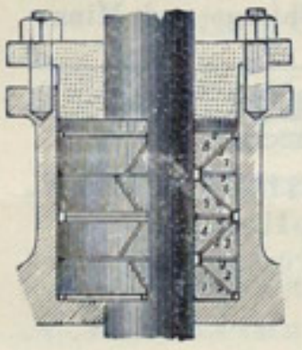

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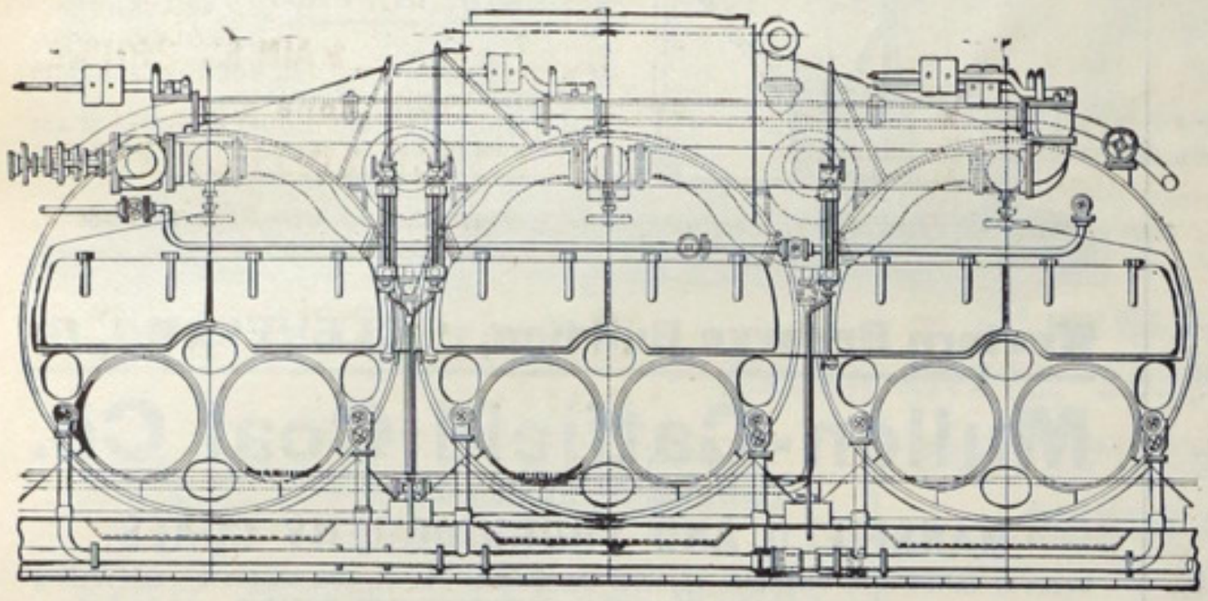

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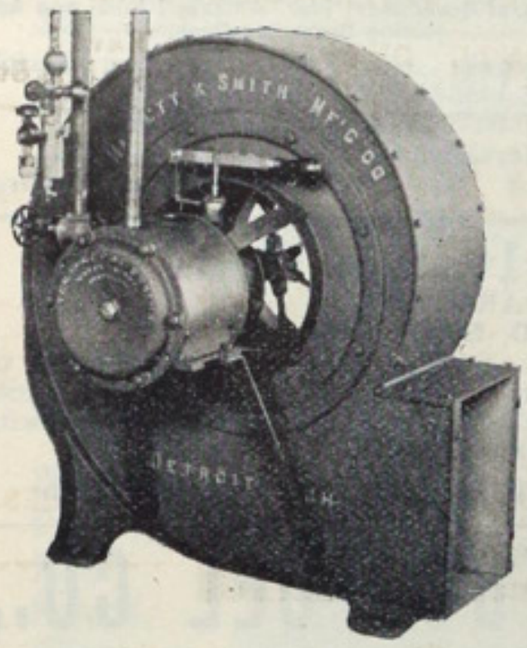

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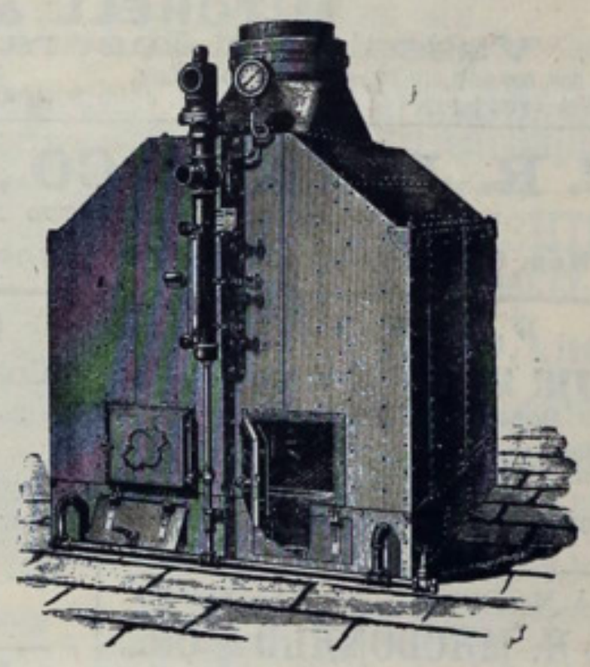

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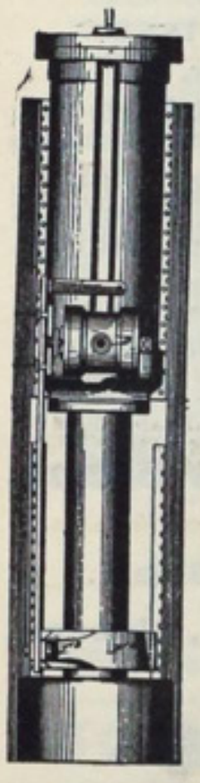

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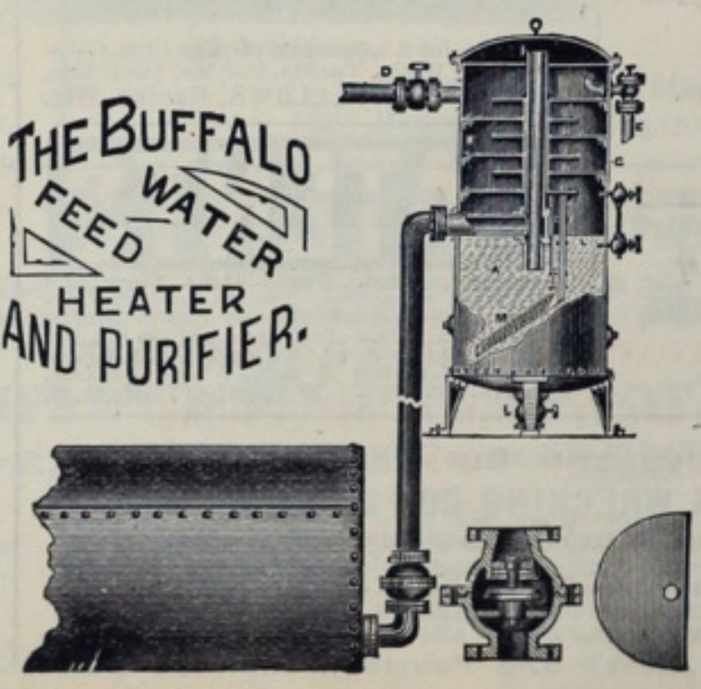

REFERENCES.

A.—Settling chamber.
B.—Boiler.
C.—Feed pipe to boiler.
D.—Steam pipe.
E.—Water supply pipe.
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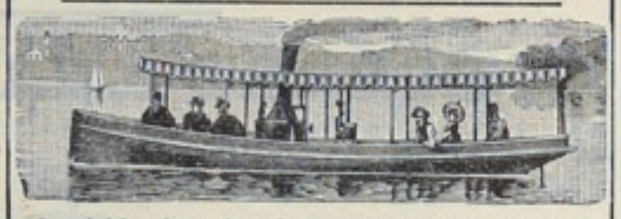

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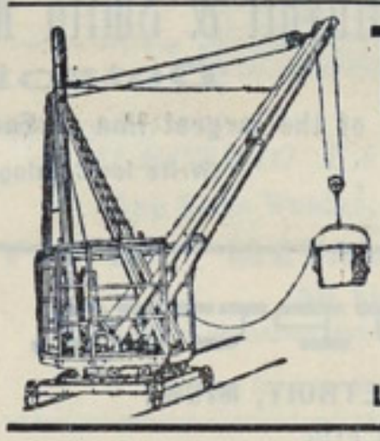

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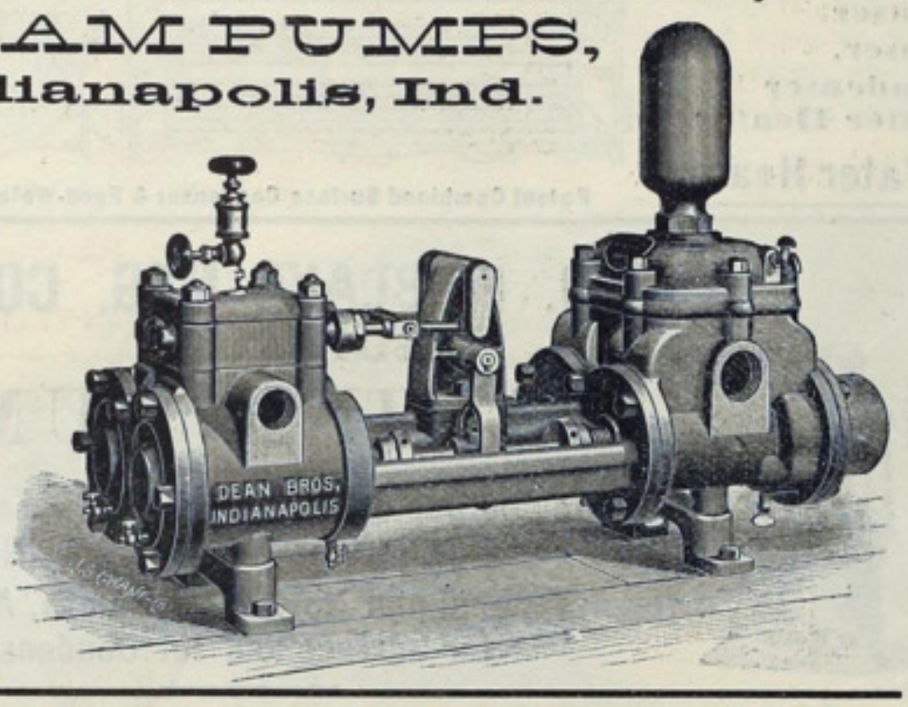

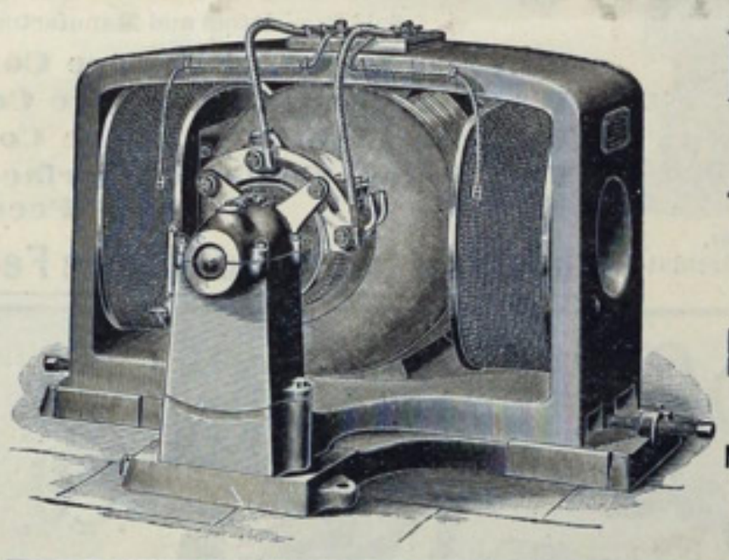

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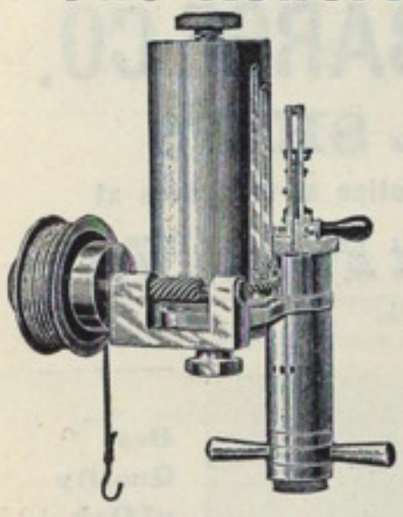

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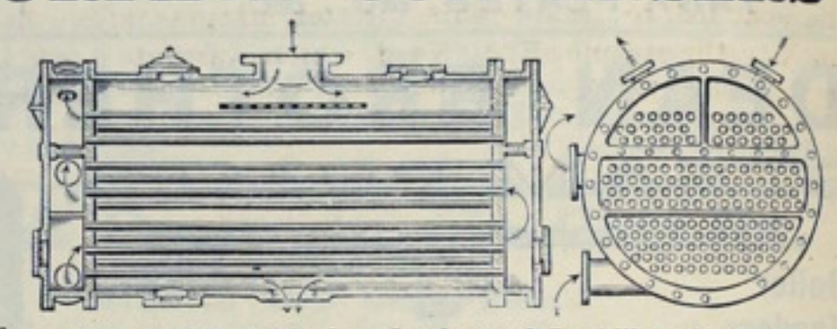

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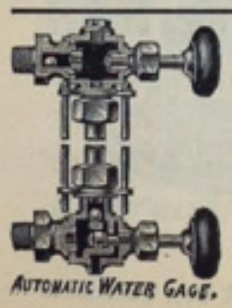

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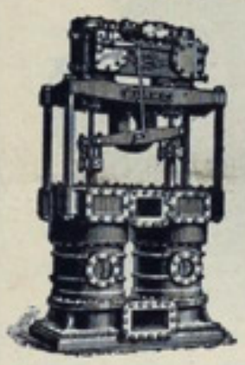

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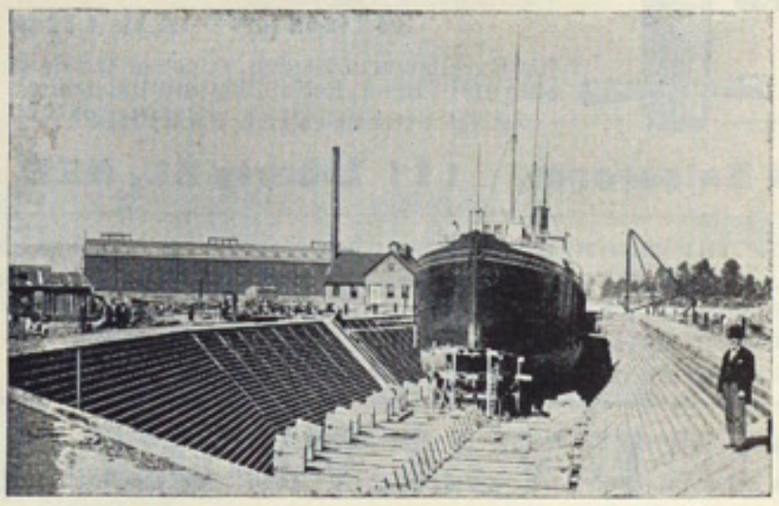

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